

cape notice. Our figure is taken from Trinius, *Icones*, and shows very well both the habit of the plant, excepting that it is densely cespitose, and the minute characters of the spikelets. The outer or empty glumes are very small and the lower one is sometimes wholly wanting.

AGROPYRUM VIOLACEUM, Hornem.—This grass was collected at Ft. Conger, Grinnell Land, by Lieut. Greely and Dr. D. L. Brainard. The specimens are fine, 8–15 cm. high, with short spikes and densely pubescent glumes, a character observed in Greenland specimens collected by Thomas M. Fries. The figure illustrates one of the specimens nearly natural size.

In 1883 Mr. Wm. M. Canby collected at the Upper Marias Pass, Montana, alt. 8,000 ft., specimens of this *Agropyrum* in which the leaves are much narrower than in the Scandinavian plant and pubescent, as are also the floral glumes. The outer glumes are smooth. All the glumes are remarkably broad with very short awns.

EXPLANATION OF PLATE III.—A, *Deschampsia brevifolia* R. Br.; entire plant, nat. size and spikelet enlarged. B, *Phippsia algida* R. Br.; entire plants and details of flowers. C, *Agropyrum violaceum*, Hornem.; entire plant, nat. size and spikelets enlarged.

The Life and Labors of Linnæus.

A. P. MORGAN.

Previous to the time of Linnæus, the science of botany was in a chaotic state. Discoveries there had been, it is true, and the science had made much progress; each discoverer seemed disposed to attach most importance to what he found out himself and proceeded to establish a system of classification upon the particular feature which he had investigated. The method of Cæsalpinus was founded on the fruit, that of Rivinus on the number of petals of the flower, that of Tournefort on the figure of the same. All were artificial because they took into consideration only one or a few features of the plants.

The problem of the great botanists of all times has been to find a natural system, one in which every plant will be shown in its perfect relation to all other plants. With this problem all the distinguished botanists of Linnæus' time were busily engaged. Haller at Göttingen labored doubtfully, sometimes despairingly, over his *Prodromus* of a German Flora and Enumeration of the Plants of Switzerland. Dillenius at Oxford improved Ray's *Synopsis* and labored faithfully upon mosses and other plants.

Bernard de Jussieu, while arranging the great Jardin des Plantes at Paris, pondered deeply the problem of a natural system. Botanists of lesser note were all occupied with the same question.

While at the university in Upsala, in 1729, Linnæus was prompted by reading a discourse by Vaillant, on the structure of flowers, to examine very closely the stamens and pistils of plants. These appendages he discovered to be essential to the vegetable and to assume as much variety as the petals; hence he conceived that they might be made the basis of a new system of classification. He thus early laid the foundation of that sexual system which he afterwards wrought up to such perfection. According to this system were arranged all his succeeding botanical observations.

The Linnæan or sexual system is briefly as follows: All known plants are divided into 24 classes, the characters of which are established upon the number or upon the difference of situation or arrangement of the stamens; the orders as far as possible on a similar number, situation or arrangement of the pistils. For example the classes are Monandria, Diandria, Triandria, etc.; stamens and pistils are present in all of the classes, to the 23d. The 24th class is the Cryptogamia containing even to this day many plants the mode and organs of whose fructification are not yet ascertained. Linnæus did not publish his system till he went to Holland, in 1735. Having paid a visit to Dr. Gronovius, of Leyden, the latter returned it and saw his *Systema Naturæ* in manuscript, which astonished him, and he requested Linnæus' permission to get it printed at his own expense. The Dutch botanists received Linnæus with the utmost cordiality and all immediately embraced and adopted his system. He rearranged the gardens of Clifford and Van Royen and assisted his friend Gronovius in the publication of his *Flora Virginica*, all of which was done upon Linnæan names and principles.

As soon as the sexual system was given to the world Linnæus strove to secure for his method the good will of distinguished botanists elsewhere. He went over to England and visited the learned botanist Dillenius, who at first received him very haughtily; but he afterward detained him a month, and at last took leave of him with tears in his eyes, wishing him to remain with him till his death. He maintained a friendly correspondence with him, though the grim old professor always adhered to the method of Ray, and made labored quotations from John Bauhin and Dr. Plukenet. He had no doubt, he said, that Linnæus would one day overthrow his own system. He gruffly called in question the genus *Dillenia*, named by Linnæus in his honor, but which

still holds good with nine species of Asiatic plants, and which furthermore has given name to the natural order Dilleniaceæ.

Linnæus received word that the celebrated Prof. Haller, at Göttingen, contemplated writing against his new method. Deprecating this he wrote to Haller the noblest protest that ever man made; from it we may make many valuable extracts. He said:

I must declare that I am anxious to avoid, if possible, all anger or controversy with you; my wish is rather to act in conjunction with you; I should detest being your adversary, and as far as possible I will avoid it. May there be peace in our days.

I dread all controversies, as, whether conqueror or conquered, I can never escape disgrace. Who ever fought without some wound or some injurious consequence? Time is too precious, and can be far better employed by me, as well as by you. I am too young to take up arms; which, if once taken, can not be laid aside till the war is concluded, which may last our lives.

If my harmless sexual system be the only cause of offense, I can not but protest against so much injustice. I have never spoken of that as a natural method; on the contrary, in my *Systema*, I have said: "No natural botanical system has yet been constructed, though one or two may be more so than others; nor do I contend that this system is by any means natural. I do not deny that a natural method is preferable, not only to my system but to all that have been invented. Probably I may, on a future occasion, propose some fragments of such a one. Meanwhile, till that is discovered, artificial systems are indispensable."

Haller's reply was cordial and removed all cause for anxiety. He pronounced the report to be false; it had not entered his mind to disturb a young man of so much merit in the science of botany, in the commencement of his fame and fortune.

Linnæus was delighted and very grateful. "I rejoice with all my heart," he wrote, "that the rumor was unfounded, for indeed you and Dillenius are the only people I would not wish to have for adversaries." The life-long correspondence between these two great men is exceedingly interesting.

Before returning to his native country Linnæus went to Paris and visited the Jussieus. Although "they would not stir a step from the method of Tournefort," yet they received him most hospitably and made him very welcome. They showed him their herbaria and that of Tournefort, and the large collection of books belonging to Dr. Isnard. They made excursions to Fontainebleau and Burgundy solely for the purpose of showing Linnæus the finest plants that were to be met with in the neighborhood of Paris. He was elected corresponding member of the Academy of Sciences, and Du Fay proposed to Linnæus to become a Frenchman, in which case the Academy would appoint him one of its members with an annual salary. His correspondence continued with Bernard de Jussieu, who, though continually plan-

ning the natural system, afterward published by his nephew, recommended the works of Linnæus to his pupils and caused them to be published and sold at Paris.

Although the Oxfordian professor held aloof from the Linnæan system, nevertheless it was speedily adopted and put in practice in England and America. His faithful disciples, John Ellis and Peter Collinson, were unwearied in their efforts to promulgate his doctrine. They were rich merchants, actively engaged in trade, and with a love for natural history pursuits. Through their shipmasters they gathered plants from every country in the world and sent them to Linnæus. Their correspondence was extensive, especially with America, and through them Linnæus obtained most of his American plants.

After a while the mighty Solander, one of Linnæus' pupils, was sent to London. He sailed round the world with Captain Cook, and returning to London, laid the foundation of the Hortus Kewensis of his friend Aiton. By his elegant and engaging manners he gained the favor of those high in authority, and overthrew at court the old regime in the person of the great Dr. Hill. When a king's botanist was to be appointed for the provinces Ellis and Collinson secured the place for their friend John Bartram.

Linnæus had several occasional correspondents in America, though most of the plants seem to have been sent through Ellis and Collinson.

His Excellency Cadwallader Colden, Governor of New York, addressed him stately and learned letters from his residence at Coldenham. He favored and assisted the enterprises of his student Peter Kalm, and facilitated his journeys through that part of North America. Linnæus named a genus for him, *Coldenia*. His daughter was an excellent botanist and had mastered the method of Linnæus. John Ellis writes: "This young lady merits your esteem and does honor to your system; she has drawn and described 400 plants in your method only." She figured and described the Gold-thread. Ellis sent her characters to Linnæus and begged him to call this plant *Coldenella*.

John Bartram was unwearied in his labors and gathered everything into his garden at Philadelphia that he could lay his hands on. He was much beloved by Dr. Garden, of Charleston, and they visited each other often. When Bartram was appointed king's botanist in America, Dr. Garden appeared to be greatly astonished. He wrote to Ellis: "Is it really so? Surely John is a worthy man; but yet to give the title of 'king's botanist' to a man who can scarcely spell, much less make out the characters

of any one genus of plants, appears to me rather hyperbolic. Pray how is this matter?"

Dr. Garden was a very scholarly man; he was educated at Edinburgh; his letters to Linnæus were addressed in elegant Latin. He practiced medicine at Charleston, S. C., till after the revolution, when, with many other royalists, he felt compelled to return to Great Britain. He attempted twice to penetrate through the wilderness to the Mississippi river, but was compelled to return by the danger arising from the disturbed state of the country. He sent many plants as well as animals to Linnæus through Ellis and directly. He was very anxious to have a plant named for his friend and valued correspondent, *Ellisia*; he sent specimens and figures of the plant and persisted in his choice a long time. But Linnæus decided that his plant belonged to a genus already established; this was a great disappointment to him. Ellis named the elegant genus *Gardenia* after him.

The difficulties of shipping plants and sending letters in that day are well illustrated in many of his letters. His letters and packages were captured by the French time and again, and his lamentations are pitiful. He writes to Ellis after one such disaster:

My grief at my own and your disappointment is inexpressible. A few days ago I heard that both Captain Coats and Cheeseman were taken and with them the two most valuable collections of seeds that ever I could promise or even hope to procure for you. There was every kind that you mentioned in your letter to me and many new and curious shrubs besides. They were all carefully packed exactly as you directed. My patience is gone. I would have given twenty guineas if you had only got one box. I never shall have anything like them again.

The Linnæan system of classes and orders held sway for a hundred years and many people in this country, not yet very old, studied Mrs. Lincoln's Botany. Even after the recognition of the natural system of Jussieu, it was customary to prefix to floras the Linnæan system as a key to the genera. No other such convenient artificial classification of plants was ever invented, and the impetus it gave to the study of plants throughout the civilized world was never equaled. The facility with which the plants of a limited region could be marshaled into regular order was wonderful and young men and women, and old, too, took to the study of botany; it became the craze of the time. Linnæus sent his students abroad and busied himself with arranging under their proper classes and orders the plants from the uttermost parts of the earth. The latest edition of his *Systema Naturæ* contained more than 1,200 genera and nearly 8,000 species.

It is a singular fact that Linnæus did not at first perceive the

great value of the binomial nomenclature. He established the classes and orders of the sexual system and bent his energies to describing and defining genera with greater precision. He continued to distinguish species by the explanatory phrases of the older botanists. Some examples from the Flora Lapponica will illustrate this. Three species of Violet are named thus:

276. VIOLA foliis cordato-obtusis, pedunculis caulinis.

277. VIOLA foliis cordatis oblongis, pedunculis fere radicatis.

278. VIOLA foliis subrotundis cordatis pedunculis radicatis.

These species he afterward called *Viola biflora*, *Viola canina* and *Viola palustris*.

The labor of handling these long names is apparent from the following extract from a letter from Dillenius to Linnæus:

In your last letter of all, I find a plant gathered in Charles Island, on the coast of Gothland, which you judge to be *Polygonum erectum augustifolium*, *floribus candidis* of Mentzelius and *Caryophyllum saxatilis*, *foliis gramineis, umbellatis corymbis*, C. Bauhin; nor do I object. But it is by no means Tournefort's *Lychnis alpina linifolia multiflora, perampla radice*, whose flowers are more scattered and leaves broader in the middle, though narrower at the end.

The plant, the object of all these maledictions, seems to have been *Gypsophila fastigiata* L.

In 1753 appeared what Haller emphatically termed Linnæus' "maximum opus et æternum," the *Species Plantarum*. To give this work its utmost perfection had been the author's object for many years, and to this all his other botanical productions were in some measure only preparatory, as the rightly ascertaining of species is the great end of all method. It is in this work that Linnæus first employs *trivial* names, as he termed them, which are single epithets, expressive as far as possible of the essential specific differences among the species of a genus, or, in default of these, of some striking and obvious character; not seldom they are local terms or the names of the first discoverers.

Although the Linnæan classes and orders for plants have passed away yet it is wonderful how well the Linnæan genera and species have stood the test of time; this is owing to the remarkable exactness of his descriptions as well as his keen perception of the relationships of plants. Linnæus was accustomed from his earliest youth to put a high value on verbal accuracy and logical precision. He improved the distinctions of genera and species and introduced a better nomenclature on the binomial method. His verbal accuracy and the remarkable terseness of his language reduced the crude matter that was stored up in the folios of his predecessors to a form that was accessible to all

men. The knowledge which he displayed, and the value and simplicity of the improvements which he proposed, secured the universal adoption of his suggestions and crowned him with a success altogether unparalleled in the annals of science.

Notes on the Flora of Eastern Virginia.

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While engaged in making a geological reconnoissance through the State of Virginia, and as far south as the Roanoake river in North Carolina, during the month of August of the present year, I made a few botanical notes, usually without collecting specimens, except where the plant was doubtful or specially desirable. The terrain to be studied forms a narrow belt, rarely over fifteen miles in width, and extends in a direction slightly west of south from Washington, following the Potomac river as far as Aquia Creek, passing through Fredericksburg, Richmond and Petersburg, from which point it was barely traceable to Weldon, North Carolina. It is the newer or younger Mesozoic of Rogers and Fontaine, or Potomac formation of Mr. W. J. McGee, of the United States Geological Survey, and contains several beds of fossil plants which were the special object of my investigations.

My familiarity with the flora of Washington and vicinity rendered it both easy and interesting to note the more conspicuous changes which the flora undergoes in passing southward, and my notes were almost wholly confined to this aspect of the question. They were usually taken from the carriage, without stopping to make special researches, and it is therefore very evident that the species enumerated below can form only a small part of the whole number, which a thorough investigation of the localities named would show to exist as marking the differences between the flora of those localities and that of Washington. It was, moreover, impossible to note the absence of Washington species, although in a few cases this was quite conspicuous. Where species rare at Washington became common, the fact was noted as well as that of the appearance of entirely new forms. The arboreous vegetation, as being the most striking as well as the most important, naturally claimed special attention, but the more humble forms were not overlooked. Meager as my notes are, however, I find it necessary to omit many minor points, in order to restrict this article to such limits as I presume to be suitable to the pages of the GAZETTE.